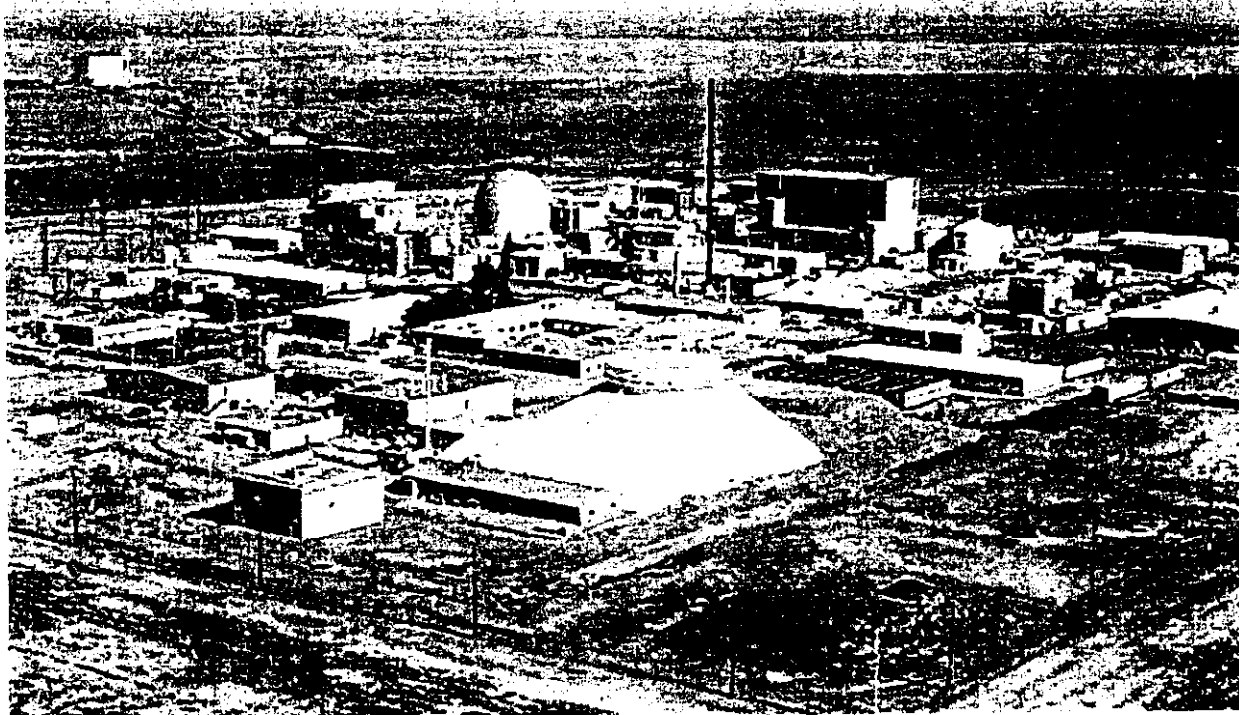


IDAHO DEPARTMENT  
OF HEALTH AND  
WELFARE

DIVISION OF  
ENVIRONMENTAL  
QUALITY

## Final Record of Decision

# Argonne National Laboratory - West



Operable Unit 9-04  
Idaho National Engineering and Environmental Laboratory  
Idaho Falls, Idaho

# **Final Record of Decision Argonne National Laboratory - West**

September 29, 1998

Prepared by:

The Department of Energy  
The Idaho Department of Health and Welfare-Division of Environmental Quality  
and  
the Environmental Protection Agency-Region 10

Operable Unit 9-04  
Idaho National Engineering and Environmental Laboratory  
Idaho Falls, Idaho



# **DECLARATION OF THE RECORD OF DECISION**

## **Site Name and Location**

Argonne National Laboratory - West, Waste Area Group 9  
Operable Unit 9-04  
Idaho National Engineering and Environmental Laboratory  
Idaho Falls, Idaho

## **Statement of Basis and Purpose**

The Argonne National Laboratory - West (ANL-W) Waste Area Group 9 (WAG 9) is one of the ten Idaho National Engineering and Environmental Laboratory (INEEL) WAGs identified in the Federal Facility Agreement and Consent Order (FFA/CO). The FFA/CO was signed by the U.S. Environmental Protection Agency (EPA) Region 10, the Idaho Department of Health and Welfare (IDHW), and the U.S. Department of Energy (DOE). Operable Unit (OU) 9-04 is listed as the "WAG 9 Comprehensive Remedial Investigation (RI)/Feasibility Study (FS)", in the FFA/CO. The RI/FS task was to assemble the investigations previously conducted for WAG 9, to thoroughly investigate the sites not previously evaluated, and to determine the overall risk posed by the WAG. This resulting comprehensive Record of Decision (ROD) document identifies eight areas for remedial action and an additional 33 release areas for "No Action" based on the risk to human health and the environment. The remedial actions have been chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), of 1986, as amended by the Superfund Amendments and Reauthorization Act, and to the extent practical with the National Oil and Hazardous Substances Pollution Contingency Plan. It is also designed to satisfy the requirements of the FFA/CO. This decision is based on information contained in the Administrative Record for the investigation for the ANL-W facility (WAG 9).

The DOE is the lead agency for this decision. The EPA and IDHW have participated in the evaluation of the alternatives. The EPA and IDHW both concur with the selected and contingent remedy for the clean-up of the eight ANL-W areas of concern and with the No Action determinations for the 33 remaining areas.

## **Assessment of the Site**

Eight areas at ANL-W have actual or threatened releases of hazardous substances, which, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to human health or the environment. These eight areas include the; Sanitary Sewage Lagoons (ANL-04), Industrial Waste Pond, Ditches A, Ditch B, (all from ANL-01), Main Cooling Tower Blowdown Ditch (ANL-01A), Interceptor Canal-Canal and-Mound (sub-portions of ANL-09), and the Industrial Waste Lift Station Discharge Ditch (ANL-35). The response actions selected in this ROD are designed to reduce the potential threats to human health and the environment to acceptable levels. The remaining 33 areas were determined to have acceptable risk to human health or the environment, and therefore require no action.

## Description of the Remedial Action Objectives

The Remedial Action Objectives (RAOs) are based on those specified in the National Contingency Plan. For the ANL-W site, the RAO for human health is to prevent direct exposure to radionuclide contaminants of concern (COCs) that would result in a total excess cancer risk of greater than 1 in 10,000 (1E-04) to current and future workers and future residents. The RAOs for the protection of the environment is to prevent exposure to COCs in soils which may have potential adverse effects to resident populations of flora and fauna, as determined by a Hazard Quotient (HQ) = 10 times the HQ calculated from INEEL background soil concentrations.

To meet these RAOs, the risk-based calculation of the concentrations that meet these RAOs were calculated. These concentrations are called the remediation goals (RGs) and establish the quantitative cleanup levels for the contaminated sites. The RGs for the cesium-137 for human health was determined by using a calculation of the concentration needed to produce a risk of 1E-04 for a future resident 100 years from now. As shown in Table A-1, the RG for the cesium-137 is 23.3 pCi/g for the three sites with unacceptable human health risks (the Interceptor Canal-Canal, the Interceptor Canal-Mound, and the Industrial Waste Pond). Likewise, the RGs for the ecological receptors were also risk determined by back calculating the concentrations which cause a hazard quotient equal to 10 times the hazard quotient caused by INEEL natural background soil concentrations. The RGs for the six sites that will undergo remediation for the ecological receptors are shown in Table A-1.

**Table A-1. Final Remediation Goals for the WAG 9 Sites.**

Receptor	Site	Contaminant	95% UCL Concentration <sup>1</sup>	RG* Concentration <sup>1</sup>
Human Health	Interceptor Canal-Mound (ANL-09)	cesium-137	30.53	23.3
Human Health	Interceptor Canal-Canal (ANL-09)	cesium-137	18	23.3
Human Health	Industrial Waste Pond (ANL-01)	cesium-137	29.2	23.3
Ecological	Industrial Waste Pond (ANL-01)	chromium III	1,030	500
Ecological	Industrial Waste Pond (ANL-01)	mercury	2.62	0.74
Ecological	Industrial Waste Pond (ANL-01)	selenium	8.41	3.4
Ecological	Industrial Waste Pond (ANL-01)	zinc	5,012	2,200
Ecological	Ditch A (ANL-01)	mercury	3.94	0.74
Ecological	Ditch B (ANL-01)	chromium III	1,306	500
Ecological	Ditch B (ANL-01)	zinc	3,020	2,200
Ecological	Main Cooling Tower Blowdown Ditch (ANL-01A)	chromium III	709	500
Ecological	Main Cooling Tower Blowdown Ditch (ANL-01A)	mercury	8.83	0.74
Ecological	Sewage Lagoons (ANL-04)	mercury	3.2	0.74
Ecological	Industrial Lift Station Discharge Ditch (ANL-35)	silver	352	112

<sup>1</sup> - Concentrations in mg/kg or pCi/g

\* - Backward calculated risk-based concentration at the 1E+04 level for humans and ten times background for ecological receptors.

## **Description of the Selected Remedy**

The selected remedy for these sites; Industrial Waste Pond and associated Ditches (ANL-01), Main Cooling Tower Blowdown Ditch (ANL-01A), Sanitary Sewage Lagoons (ANL-04), Interceptor Canal (ANL-09), and the Industrial Waste Lift Station Discharge Ditch (ANL-35) is phytoremediation. Phytoremediation is the generic term for "phytoextraction" an innovative/emerging technology that utilizes plants to extract the contaminants from the soil. Phytoremediation would be conducted insitu to remove the metals and the radionuclides from the soils via normal uptake mechanisms of the plants. The plant vegetation is then harvested, sampled, and shipped to an incinerator on the INEEL for volume reduction. The resultant ash will then be sampled and sent to a permitted disposal facility. Phytoremediation would not be initiated on the Sanitary Sewage Lagoons (ANL-04) until approximately 2033 when the ANL-W facility is scheduled for closure. The start of the phytoremediation for the Industrial Waste Pond (ANL-01) will not be initiated until the cooling water discharges from the sodium processing facility are completed. The final sodium cooling water discharges are planned for 2002. This delay in phytoremediation startup for either site dose not pose any increase in the risks to human health and or the environment.

The effectiveness and technical implementability of phytoremediation are very site-specific. DOE estimates that five growing seasons would be required to meet the established Remedial Action Objectives. This estimate assumes natural decay of the cesium-137 along with five percent uptake by the plants. Sample results of the ANL-W sites show the contaminants are predominantly bound in the upper foot of soils. Thus, most of the contaminants are already within the plant root zone and no major movement of soil is necessary. The plants would require additional irrigation and soil amendments. The plant stalks along with the wetted soil condition would help control the spread of windblown contaminants. DOE has conducted a bench-scale testing of soils in 1998 to determine applicability of this remedial alternative. DOE has tested native and non-native INEEL plant species for their applicability for phytoremediation. Where non-native plant species are planted, the plants will be harvested before they go to seed.

It is anticipated that phytoremediation will remove contaminants to acceptable levels after five field seasons. These acceptable levels are defined by the Remedial Action Objectives (RAOs) for the contaminated soils at ANL-W. Phytoremediation will eliminate the need for long-term monitoring and maintenance activities, surface water diversions, land use and access restrictions after 100 years, and long term environmental monitoring (air, sediment, and groundwater). The major components of the selected remedy for ANL-W are:

- Completion of phytoremediation workplan for the field-scale testing
- Conducting a field-scale phytoremediation test of selected plant species at the sites that pose unacceptable risks
- Determining the effectiveness and implementability of phytoremediation based on results of field-scale testing
- Collecting soil and plant samples after a two-year field season to be used to determine the effectiveness of phytoremediation on the ANL-W soils
- Harvesting, compacting, incinerating, and disposing of the above- and below-ground plant matter that will be sent to a permitted landfill

- Continuing the planting/harvesting process for phytoremediation only if completion of the two-year field-scale testing is successful. This process would continue until RAOs are attained
- Installing access restrictions consisting of fences, bird netting, and posting warning signs
- Review of the remedy no less than every five years after the RAOs have been met until the year 2098
- Implementing DOE controls which limit residential land use for at least 100 years from now (2098).

## **Description of Contingent Remedy**

If it is determined that the selected remedy of phytoremediation does not adequately reduce the principle risks to human health and the environment after completion of the two-year field season, a contingent alternative of excavation and disposal has been selected. The contingent remedy of excavation and disposal would be used to remove contaminated soils from the Industrial Waste Pond and associated Ditches A, B, and C (ANL-01), Main Cooling Tower Blowdown Ditch (ANL-01A), Sanitary Sewage Lagoons (ANL-04), Interceptor Canal-Mound (ANL-09), and the Industrial Waste Lift Station Discharge Ditch (ANL-35). The on-INEEL site disposal location for these contaminated soils could consist of a yet to be built Soils Repository at the Idaho Chemical Processing Plant or the Radioactive Waste Management Complex (RWMC). The final on-INEEL site location would be determined during the Remedial Design/Remedial Action phase for WAG 9. Excavation and disposal activities would not be initiated on the Sanitary Sewage Lagoons (ANL-04) until approximately 2033 when the ANL-W facility is scheduled for closure. The start of the phytoremediation for the Industrial Waste Pond (ANL-01) will not be initiated until the cooling water discharges from the sodium processing facility are completed. The final sodium cooling water discharges are planned for 2002. This delay in excavation and disposal startup for either site does not pose any increase in the risks to human health and or the environment. The major components of the contingent remedy for ANL-W are:

- Contaminants in the waste areas will be excavated and transported to either the RWMC or the INEEL Soils Repository for on-INEEL disposal
- Verification sampling would be used to validate that the remaining soil concentrations are below the Remedial Action Objectives
- Review of the remedy no less than every five years after the RAOs have been met until the year 2098
- Implementation of DOE controls which limit residential land use for at least 100 years from now (2098).

The no action alternative is reaffirmed and selected as the appropriate alternative for the remaining 33 areas at the ANL-W facility. These 33 areas have risks that are at acceptable levels based on the information gathered during the remedial investigation.

The possibility exists that contaminated environmental media not identified by the INEEL FFA/CO or in this comprehensive investigation will be discovered in the future as a result of routine

operations, maintenance activities, and decontamination and dismantlement activities at ANL-W. Upon discovery of a new contaminant source by DOE, IDHW, or EPA, that contaminant source will be evaluated and appropriate response action taken in accordance with the FFA/CO.

## **Statutory Determination**

The selected remedy and the contingent remedy for the five sites at ANL-W have been determined to be protective of human health and the environment, to comply with federal and state requirements that are legally applicable or relevant and appropriate (applicable or relevant and appropriate requirements to the remedial actions), and to be cost effective.

The selected remedy of phytoremediation utilizes permanent solutions and alternative treatment technology to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because the selected remedy of phytoremediation will result in hazardous substances remaining on-site above levels for unlimited use, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment. The agencies agree that No Action be taken at 33 additional areas.



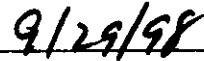
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## Signature Sheet

Signature sheet for the Record of Decision for the Waste Area Group 9 Operable Unit 9-04, at Argonne National Laboratory-West, part of the Idaho National Engineering and Environmental Laboratory, between the U.S. Department of Energy and the Environmental Protection Agency, with concurrence by the Idaho Department of Health and Welfare.



Chuck Clarke, Regional Administrator  
Region 10  
U.S. Environmental Protection Agency




Date



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Signature sheet for the Record of Decision for the Waste Area Group 9 Operable Unit 9-04, at Argonne National Laboratory-West, part of the Idaho National Engineering and Environmental Laboratory, between the U.S. Department of Energy and the Environmental Protection Agency, with concurrence by the Idaho Department of Health and Welfare.

  
\_\_\_\_\_  
John P. Kennedy  
Acting Manager, Chicago Operations Office  
U.S. Department of Energy

9/14/98  
\_\_\_\_\_  
Date



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Signature sheet for the Record of Decision for the Waste Area Group 9 Operable Unit 9-04, at Argonne National Laboratory-West, part of the Idaho National Engineering and Environmental Laboratory, between the U.S. Department of Energy and the Environmental Protection Agency, with concurrence by the Idaho Department of Health and Welfare.

 *Wallace N. Cory, Assistant Administrator*

Wallace N. Cory, Administrator

Division of Environmental Quality

Idaho Department of Health and Welfare

07/24/98  
Date



# Table of Contents

DECLARATION OF THE RECORD OF DECISION .....	iii
ACRONYMS .....	xx
1     DECISION SUMMARY .....	1-1
1.1     Site Name .....	1-1
2     SITE HISTORY AND ENFORCEMENT ACTIVITIES .....	2-1
2.1     INEEL Site Description .....	2-1
2.2     ANL-W Site History .....	2-1
2.3     Identification of Release Sites .....	2-2
2.4     Enforcement Activities .....	2-2
3     HIGHLIGHTS OF COMMUNITY PARTICIPATION .....	3-1
4     SCOPE OF OPERABLE UNITS AND RESPONSE ACTIONS .....	4-1
5     SUMMARY OF SITE CHARACTERISTICS .....	5-1
5.1     Physiography .....	5-1
5.2     Meteorology .....	5-1
5.2.1     Air Temperature .....	5-2
5.2.2     Precipitation .....	5-2
5.2.3     Evaporation and Infiltration .....	5-2
5.2.4     Wind .....	5-2
5.2.5     Special Phenomena .....	5-3
5.3     Geology .....	5-3
5.3.1     Surface Geology .....	5-3
5.3.2     Subsurface Geology .....	5-4
5.4     Soils .....	5-5
5.5     Hydrogeology .....	5-6
5.5.1     Snake River Plain Aquifer .....	5-6
5.5.2     Surface Water Hydrology .....	5-6
5.6     Ecology .....	5-13
5.7     Nature and Extent of Contamination .....	5-14
5.7.1     Nature and Extent of Groundwater Contamination .....	5-14
5.7.2     Nature and Extent of Soil Contamination .....	5-14
5.7.2.1     Industrial Waste Pond .....	5-16
5.7.2.2     Ditch A .....	5-19
5.7.2.3     Ditch B .....	5-19
5.7.2.4     Ditch C .....	5-20
5.7.2.5     Main Cooling Tower Blowdown Ditch .....	5-20
5.7.2.6     Sewage Lagoons .....	5-22
5.7.2.7     EBR-II Leach Pit .....	5-22
5.7.2.8     Interceptor Canal-Canal .....	5-23
5.7.2.9     Interceptor Canal-Mound .....	5-23



	5.7.2.10	Industrial Waste Discharge Ditch .....	5-24
	5.7.2.11	Main Cooling Tower Riser Pits .....	5-24
5.8	No Action Sites .....		5-25
	5.8.1	Operable Unit 9-01 Sites .....	5-25
	5.8.2	Operable Unit 9-02 Site .....	5-26
	5.8.3	Operable Unit 9-03 Sites .....	5-27
	5.8.4	Operable Unit 9-04 Sites .....	5-27
	5.8.5	Operable Unit 10-06 Sites .....	5-28
6	SUMMARY OF SITE RISKS .....		6-1
6.1	Human Health Risk Evaluation .....		6-1
	6.1.1	Contaminant Identification .....	6-1
	6.1.2	Exposure Assessment .....	6-1
		6.1.2.1 Exposure Scenarios .....	6-1
		6.1.2.2 Quantification of Exposure .....	6-2
	6.1.3	Toxicity Assessment .....	6-3
	6.1.4	Human Health Risk Characterization .....	6-3
	6.1.5	Risk Management .....	6-4
	6.1.6	Human Health Risk Uncertainty .....	6-4
6.2	Ecological Evaluation .....		6-14
	6.2.1	Species of Concern .....	6-14
	6.2.2	Exposure Assessment .....	6-15
	6.2.3	Ecological Risk Uncertainities .....	6-16
6.3	Groundwater Risks .....		6-16
6.4	Basis for Response .....		6-16
7	DESCRIPTION OF ALTERNATIVES .....		7-1
7.1	Remedial Action Objectives .....		7-1
7.2	Summary of Alternatives .....		7-3
	7.2.1	Alternative 1: No Action (With Monitoring) .....	7-4
	7.2.2	Alternative 2: Limited Action .....	7-4
	7.2.3	Alternative 3a and 3b: Containment Alternatives and Institutional Controls .....	7-5
	7.2.4	Alternatives 4a and 4b: Excavation and Disposal .....	7-6
	7.2.5	Alternative 5: Phytoremediation .....	7-7
7.3	Summary of Comparative Analysis of Alternatives .....		7-8
	7.3.1	Threshold Criteria .....	7-9
		7.3.1.1 Overall Protection of Human Health and the Environment .....	7-16
		7.3.1.2 Compliance with Applicable or Relevant and Appropriate Requirements .....	7-16
	7.3.2	Balancing Criteria .....	7-17
		7.3.2.1 Long-term Effectiveness and Permanence .....	7-17
		7.3.2.2 Reduction in Toxicity, Mobility, or Volume Through Treatment ..	7-17
		7.3.2.3 Short-term Effectiveness .....	7-17
		7.3.2.4 Implementability .....	7-17
		7.3.2.5 Cost .....	7-18
	7.3.3	Modifying Criteria .....	7-18

	7.3.3.1 State Acceptance .....	7-18
	7.3.3.2 Community Acceptance .....	7-18
8	SELECTED REMEDY .....	8-1
8.1	Ranking of Alternatives .....	8-1
8.2	Selected Remedy .....	8-2
8.3	Selected Contingent Remedy .....	8-3
8.4	No Action Sites .....	8-4
8.5	Remediation Goals .....	8-5
8.6	Estimated Cost Details for the Selected Remedy .....	8-6
9	STATUTORY DETERMINATIONS .....	9-1
9.1	Protection of Human Health and the Environment .....	9-1
9.2	Compliance with ARARs and To Be Considered .....	9-1
	9.2.1 Selected Remedy Compliance with ARARs .....	9-2
	9.2.2 Contingent Remedy Compliance with ARARs .....	9-2
9.3	Cost Effectiveness .....	9-7
9.4	Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Possible .....	9-7
9.5	Preference for Treatment as a Principal Element .....	9-8
10	DOCUMENTATION OF SIGNIFICANT CHANGES .....	10-1
11	RESPONSIVENESS SUMMARY .....	11-1
	APPENDIX A .....	A-1
	APPENDIX B Administrative Record .....	B-1

## Figures

Figure 1-1. Location of the INEEL and Major Facilities with Respect to the State of Idaho. ....	1-3
Figure 1-2. Location of the Argonne National Laboratory-West Sites of Concern. ....	1-5
Figure 1-3. Ownership of Lands Surrounding the INEEL. ....	1-7
Figure 2-1. Location of INEEL with respect to Counties. ....	2-3
Figure 2-2. Shaded Relief Map of WAG 9 and INEEL. ....	2-5
Figure 2-3. Aerial View of the ANL-W Facility Showing the Main Facilities. ....	2-7
Figure 5-1. Thickness of Surficial Soils at ANL-W. ....	5-7
Figure 5-2. Map Showing General Soil Types Near ANL-W. ....	5-9
Figure 5-3. Location of Monitoring Wells Near ANL-W. ....	5-11
Figure 5-4. Eleven Areas Retained for Evaluation in RI/FS. ....	5-17
Figure 6-1. Eight Areas at ANL-W with Unacceptable Human Health or Ecological Risks. ....	6-19

## Tables

Table 4-1. Summary of data available for WAG 9 and WAG 10 release sites evaluated in the OU 9-04 comprehensive RI/FS. ....	4-2
Table 5-1. Extent of Contamination Soil in WAG 9 Sites Retained for Cleanup. ....	5-15
Table 6-1. Exposure sites with human health risks greater than 1E-04. ....	6-5
Table 6-2. Contaminant hazard index greater than 1 for OU 9-04 exposure sites, scenarios, and pathways. ....	6-6
Table 6-3. Exposure sites with risks greater than 1E-06 and less than 1E-04. ....	6-7
Table 6-4. Sites retained for evaluation in the feasibility study because of human health risks. ....	6-12
Table 6-5. Uncertainties associated with the human health risk assessment. ....	6-13
Table 6-6. Sites that have unacceptable ecological risks, HQ, functional group, and species. ....	6-15
Table 6-7. Uncertainties associated with the ecological risk assessment. ....	6-17
Table 6-8. Sites with unacceptable human health or ecological risks. ....	6-18
Table 7-1. Final Remediation Goals for the WAG 9 Sites. ....	7-2
Table 7-2. Volume of Contaminated Soil in the Eight areas Retained for Cleanup. ....	7-3
Table 7-3. Comparative Analysis of Remedial Alternatives Using the Evaluation Criteria. ....	7-10
Table 7-4. Comparative Analysis of Remedial Alternatives. ....	7-16
Table 8-1. Detailed Cost Estimate Summary Sheet for Alternative 3, Containment. ....	8-7
Table 8-2. Detailed Cost Estimate Summary Sheet for Alternative 4a, Excavation and Disposal at the INEEL Soils Repository. ....	8-8
Table 8-3. Detailed Cost Estimate Summary Sheet for Alternative 4a, Excavation and Disposal at RWMC. ....	8-9
Table 8-4. Detailed Cost Estimate Summary Sheet for Alternative 4b, Excavation with Disposal at Private Facility. ....	8-10
Table 8-5. Detailed Cost Estimate Summary Sheet for Alternative 5, Phytoremediation. ....	8-11
Table 9-1. Evaluation of ARARs and TBC compliance for the selected remedy- Alternative 5: phytoremediation. ....	9-3
Table 9-2. Evaluation of ARARs and TBC compliance for the contingent remedy - excavation and On-INEEL disposal of contaminated soils. ....	9-5
Table 9-3. Net present value of capital, operating and maintenance (O&M) and total cost for remedial alternatives at OU 9-04 sites. ....	9-8

## ACRONYMS

ANL-W	Argonne National Laboratory - West
ARARs	Applicable or Relevant and Appropriate Requirements
BLS	below land surface
CFA	Central Facilities Area
COC	Contaminant of Concern
COCA	Consent Order and Compliance Agreement
COPC	Contaminant of Potential Concern
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DOE	Department of Energy
DOE-CH	Department of Energy-Chicago Operations Office
DOE-ID	Department of Energy-Idaho Operations Office
ERA	ecological risk assessment
EBR-II	Experimental Breeder Reactor II
FS	Feasibility Study
FFA/CO	Federal Facility Agreement and Consent Order
FCF	Fuel Cycle Facility
HQs	hazard quotients
HFEF/S	Hot Fuel Examination Facility South
IDHW	Idaho Department of Health and Welfare
INEEL	Idaho National Engineering and Environmental Laboratory
LMITCO	Lockheed Martin Idaho Technologies Company
MSL	mean sea level
NOAA	National Oceanic and Atmospheric Administration
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operations and Maintenance
OU	Operable Unit
PCBs	polychlorinated biphenyls
RAOs	remedial action objectives
RGs	remediation goals
RME	reasonable maximum exposure
ROD	Record of Decision
RI	Remedial Investigation
RCRA	Resource Conservation and Recovery Act
RWMC	Radioactive Waste Management Complex
SRP	Snake River Plain
SRPA	Snake River Plain Aquifer
TBC	to-be-considered
TREAT	Transient Reactor Test Facility
EPA	Environmental Protection Agency - Region 10
UMTRA	Uranium Mill Tailings Remedial Action
UCL	upper confidence limit
WAG 9	Waste Area Group 9
ZPPR	Zero Power Physics Reactor

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# Waste Area Group 9 Record of Decision

## 1 DECISION SUMMARY

### 1.1 Site Name

The Idaho National Engineering and Environmental Laboratory (INEEL) is a government facility managed by the U.S. Department of Energy (DOE), located 32 miles (51 km) west of Idaho Falls Idaho, and occupies 890 square miles (2,305 km<sup>2</sup>) of the northeastern portion of the Eastern Snake River Plain. The Argonne National Laboratory-West (ANL-W) is located in the southeastern portion of the INEEL, as shown in Figure 1-1. To better manage environmental investigations, the INEEL was subdivided into ten Waste Area Groups (WAGs). Identified contaminant releases sites in each WAG were in turn divided into operable units (OUs) to expedite the investigations and any required remedial actions. Waste Area Group 9 covers the ANL-W and contains four OUs that were investigated for contaminant releases to the environment. Within these four OUs, 37 known or suspected contaminant release sites have been identified. Two of the identified 37 release sites have been further subdivided into smaller areas based on their waste discharges and physical modeling parameter variations within a release site. Thus, the term "site" will herein refer to a named release site in one of the OUs. While "area" will herein be used to define all or a portion of an identified OU release site. This Record of Decision (ROD) applies to these 37 sites at WAG 9 and two sites from WAG 10, which, on the basis of the comprehensive remedial investigation (RI)/feasibility study (FS) for WAG 9, were identified as posing a potential risk to human health and/or the environment. Of these 39 sites, 33 are being recommended for "No Action." Figure 1-2 shows the locations of the eight areas where remedial action is proposed.

The INEEL lands are within the aboriginal land area of the Shoshone-Bannock Tribes. The Tribes have used the land and waters within and surrounding the INEEL for fishing, hunting, plant gathering, medicinal, religious, ceremonial, and other cultural uses since time immemorial. These lands and waters provided the Tribes their home and sustained their way of life. The record of the Tribes' aboriginal presence at the INEEL is considerable, and DOE has documented an excess of 1,500 prehistoric and historic archeological sites at the INEEL.

Facilities at the INEEL are primarily dedicated to nuclear research, development, and waste management. Surrounding areas are managed by the Bureau of Land Management for multipurpose use. The developed area within the INEEL is surrounded by a 500 square mile (1,295 km<sup>2</sup>) buffer zone used for cattle and sheep grazing. Communities nearest to ANL-W are Atomic City (southwest), Arco (west), Butte City (west), Howe (northwest), Mud Lake (northeast), and Terreton (northeast). In the counties surrounding the INEEL, approximately 45% is agricultural land, 45% is open land, and 10% is urban. Sheep, cattle, hogs, poultry, and dairy cattle are produced; and potatoes, alfalfa, sugar beets, wheat, barley, oats, canola, sunflower, forage, and seed crops are cultivated. Most of the land surrounding the INEEL is owned by private individuals or the U.S. Government, as shown in Figure 1-3.

Public access to the INEEL is strictly controlled by fences and security personnel. State Highways 22, 28, and 33 cross the northeastern portion of the INEEL approximately 20 miles (32.2 km),

and U.S. Highways 20 and 26 cross the southern portion approximately 5 miles (8 km) away from ANL-W, respectively. A total of 90 miles (145 km) of paved highways pass through the INEEL and are used by the general public.

The Snake River Plain Aquifer (SRPA), the largest potable aquifer in Idaho, underlies the Eastern Snake River Plain and the INEEL. The aquifer is approximately 200 miles (322 km) long, 20 to 60 miles (32.2 to 96.5 km) wide, and covers an area of approximately 9,600 square miles (24,853 km<sup>2</sup>). The depth to the SRPA varies from approximately 200 feet (61 m) in the northeastern corner of the INEEL to approximately 900 feet (274 m) in the southeastern corner. This change in groundwater depth in the northeastern corner to the southeastern corner occurs over a horizontal distance of 42 miles (67.6 km). Depth to groundwater is approximately 640 feet (195 m) below ANL-W and the groundwater flow direction is south-southwest. Drinking water for employees at ANL-W is obtained from two production wells located in the west-central portion of the ANL-W facility.

Most INEEL facilities are currently operated by one of three Government contractors: Lockheed Martin Idaho Technologies Company (LMITCO), Westinghouse Electric Corporation, and Argonne National Laboratory-West. These contractors conduct various programs at the INEEL under the supervision of three DOE offices: DOE-Idaho (DOE-ID), Department of Defense-Pittsburgh Naval Reactors Office, and DOE-Chicago (DOE-CH).

ANL-W, a prime operating contractor to DOE-CH, began a redirected nuclear research and development program in FY 1995. The redirected program involves research to help solve near-term high priority missions including the treatment of DOE spent nuclear fuel and reactor decontamination and decommissioning technologies. ANL-W is also currently in the process of conducting shutdown and termination activities for the Experimental Breeder Reactor II (EBR-II). Within the ANL-W site are a number of research and support facilities that contribute to the total volume of waste generated at ANL-W. These facilities currently generate radioactive low-level waste, radioactive transuranic waste, hazardous waste, mixed waste, sanitary waste, and industrial waste. Approximately 750 people are employed at the ANL-W facility.

The ANL-W facility does not have any identified wetlands, is not in the 100-year floodplain, and has been screened as to its potential for habitat to rare and endangered species. One facility at ANL-W, the EBR-II reactor may be listed as a historic building eligible for listing on the National Register in the future. The selected and contingent remedial alternatives would not impact the EBR-II facility.

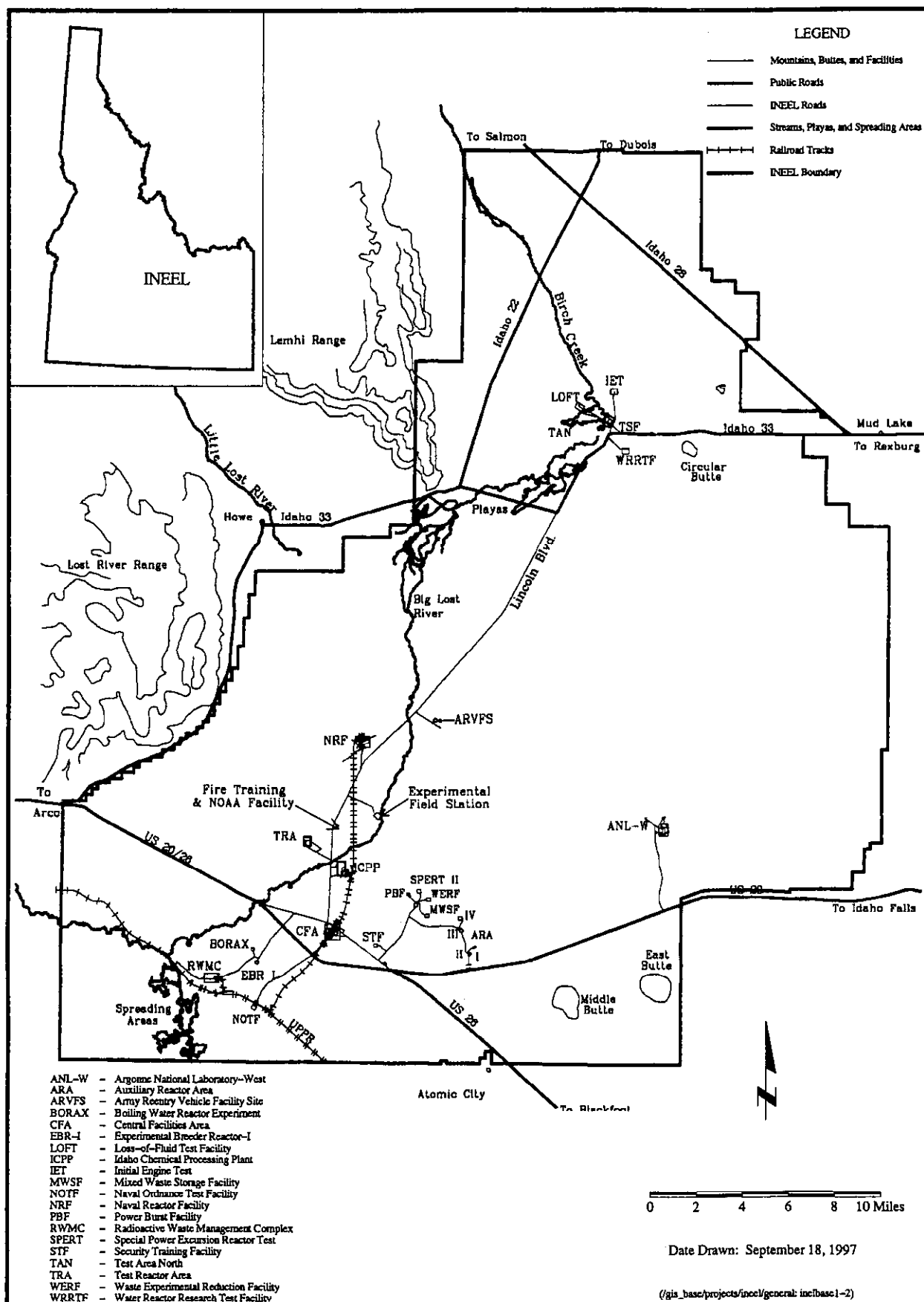


Figure 1-1. Location of the INEEL and Major Facilities with respect to the State of Idaho.



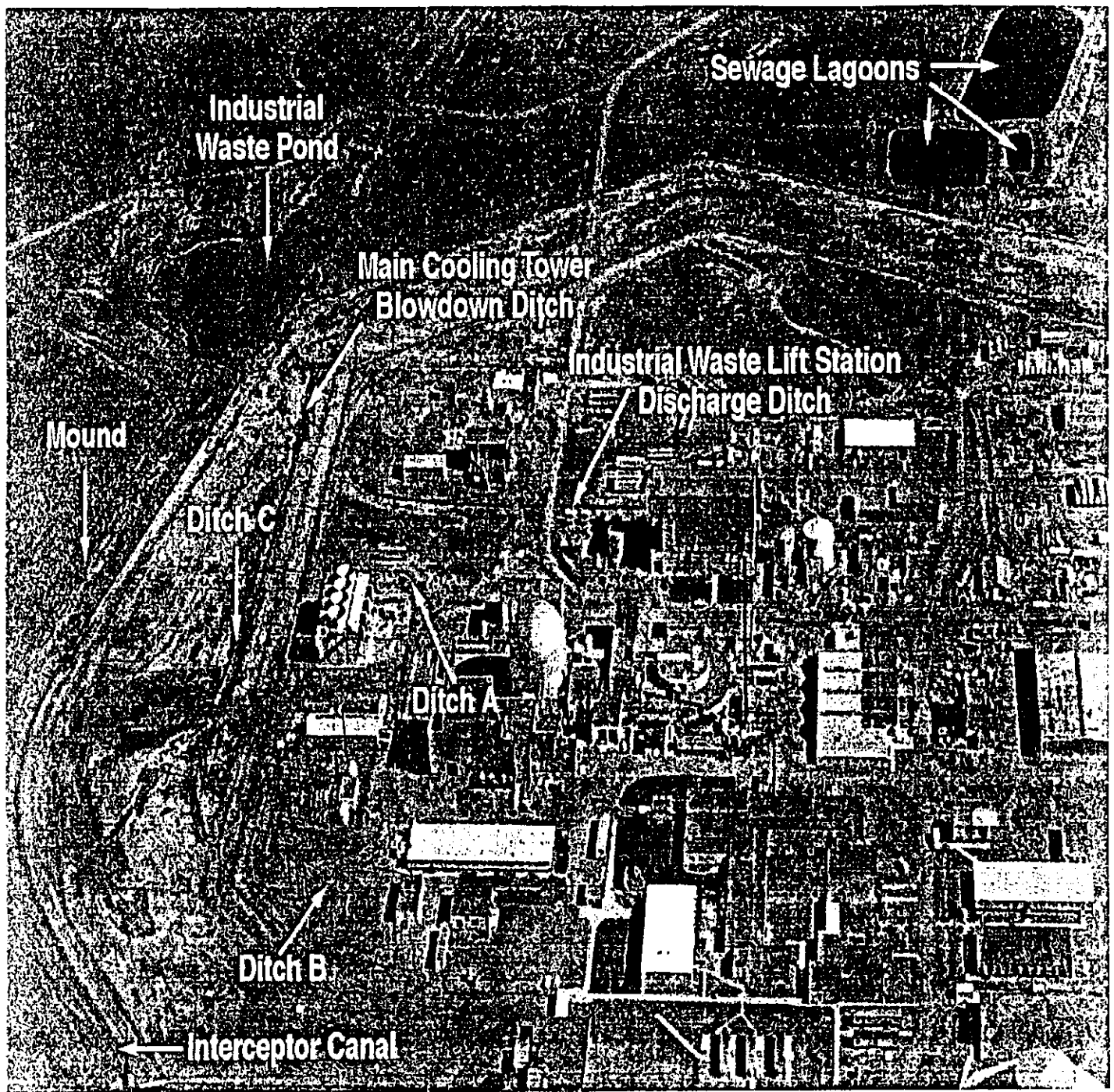
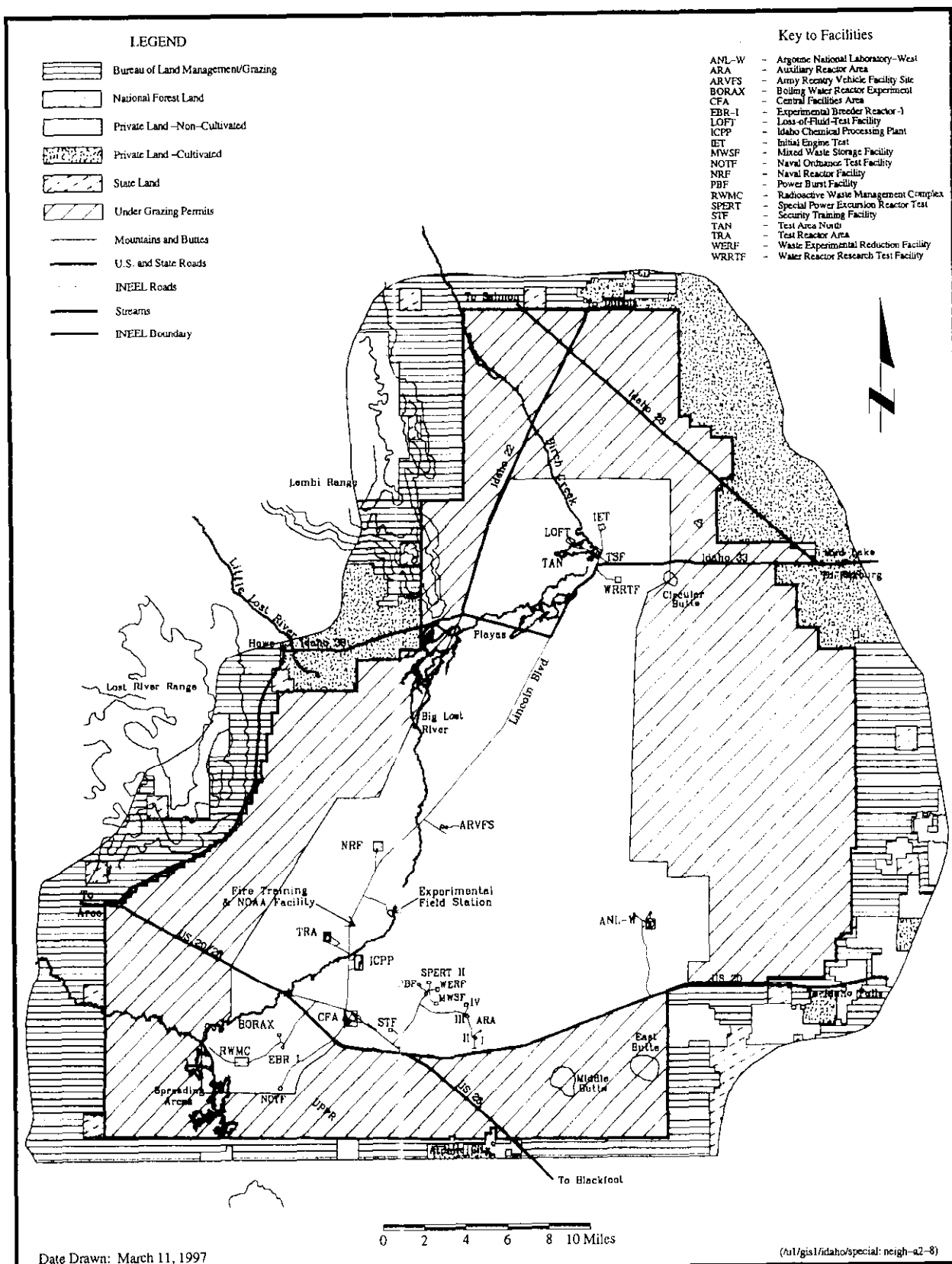


Figure 1-2. Location of the Argonne National Laboratory-West Sites of Concern.



**Figure 1-3.** Ownership of Lands Surrounding the INEEL.

## **2 SITE HISTORY AND ENFORCEMENT ACTIVITIES**

### **2.1 INEEL Site Description**

The INEEL site occupies approximately 890 square miles (2,300 km<sup>2</sup>) of the northwestern portion of the eastern Snake River Plain (SRP) in southeast Idaho. The INEEL site is nearly 39 miles (63 km) long from north to south and about 36 miles wide (east-west) in its broadest southern portion. The INEEL includes portions of five Idaho counties (Bingham, Bonneville, Butte, Clark, and Jefferson) and lies within Townships 2 to 8 N and Ranges 28 to 34 E, Boise baseline and meridian. Figure 2-1 shows the location of the INEEL with respect to the counties and State.

The surface of the INEEL is a relatively flat, semiarid, sagebrush desert, with predominant relief being manifested either as volcanic buttes jutting up from the desert floor or as unevenly surfaced basalt flows or flow vents and fissures. Elevations on the INEEL range from 5,200 ft in the northeast to 4,750 ft in the central lowlands, with an average elevation of 4,975 ft. Figure 2-2 shows the shaded relief map of the WAG 9 and the rest of the INEEL.

### **2.2 ANL-W Site History**

The ANL-W was established in the mid 1950s and is located approximately 30 miles west of Idaho Falls. ANL-W houses extensive support facilities for three major nuclear reactors: Transient Reactor Test Facility (TREAT), EBR-II, and the Zero Power Physics Reactor (ZPPR). The location of the main facilities at ANL-W are shown in Figure 2-3.

The first reactor to operate at the ANL-W site was TREAT, which was built in 1959. As its name implies, TREAT was designed for overpower transient tests of fuel. Its driver fuel, consisting of finely divided uranium oxide in a graphite matrix, has a high heat capacity that enables it to withstand tests in which experimental fuel may be melted. Used extensively at first for safety tests of water-reactor fuels, TREAT is now used mainly for safety tests for various fuel types as well as for non reactor experiments. It has periodically undergone modifications as part of the TREAT upgrade project.

The EBR-II a 62.5 megawatt thermal reactor went into operation in 1964 capable of producing 19.5-megawatts of electrical power in the liquid metal reactor power plant. It is a pool-type sodium-cooled reactor, designed to operate with metallic fuel. It was provided with its own Fuel Cycle Facility (FCF) adjacent to the reactor building for remote pyrometallurgical reprocessing and refabrication of reactor fuel. The Fuel Cycle Facility operated from 1964 providing five complete core loadings of recycled fuel for EBR-II.

Over the years, the mission of the EBR-II has been redirected from that of a power-plant demonstration with integral fuel cycle to that of an irradiation test facility for mixed uranium-plutonium fuels for future liquid metal reactors. The pyrometallurgical process used in the Fuel Cycle Facility was not suitable for ceramic fuels so the Fuel Cycle Facility was converted to a Hot Fuel Examination Facility South (HFEF/S).

EBR-II continued to be fueled with metallic uranium driver fuel for operating convenience. This fuel was gradually improved to greatly increase its burnup, thus contributing to a high plant factor for irradiation tests. Over the years of operation, much valuable operating experience has been gained on sodium systems, including the removal and maintenance of primary sodium pumps and other components. In the 1970s, the mission of the EBR-II was again shifted in emphasis, this time to the Operational Reliability Testing Program. This program was aimed at studying the milder but more probable types of fuel and reactor malfunctions that could lead to accident sequence. In addition to preventing accidents, its aim was to better define the operating limits and tolerable faults in reactor operation, thus leading to both safer and more economical plants. The components of this program in EBR-II included tests of fuel to and beyond cladding breach, loss-of-coolant flow tests, mild power transients, and studies of man-machine interfaces.

In the early 1980s, ANL-W reexamined the basic design of liquid-metal-cooled fast reactors. The results of this study led to the Integral Fast Reactor (IFR) concept. The IFR incorporates four basic elements: sodium cooling; a pool configuration; a compact, integral fuel cycle facility; and a ternary metal alloy fuel. Modifications to the EBR-II and the HFEF/S facilities have been made to support the pyroprocessing and fuel manufacturing for the IFR demonstration project. Since 1994, ANL-W has been conducting shutdown and termination activities for the EBR-II. These shutdown activities include defueling and draining the primary and secondary sodium loops and placing the reactor in a radiologically safe shutdown condition. The Fuel Cycle Facility has been converted to a Fuel Conditioning Facility. The mission of the Fuel conditioning Facility is to electrochemically treat EBR-II fuel to create radioactive waste forms which are acceptable for disposal in a national geologic repository.

The ZPPR was put into operation at ANL-W in 1969. The ZPPR is large enough to enable core-physics studies of full-scale breeder reactors that will produce up to 1,000 megawatts. ZPPR has also been used for mockups of metallic cores and space-reactor cores. ZPPR was placed in programmatic standby in fiscal year 1989.

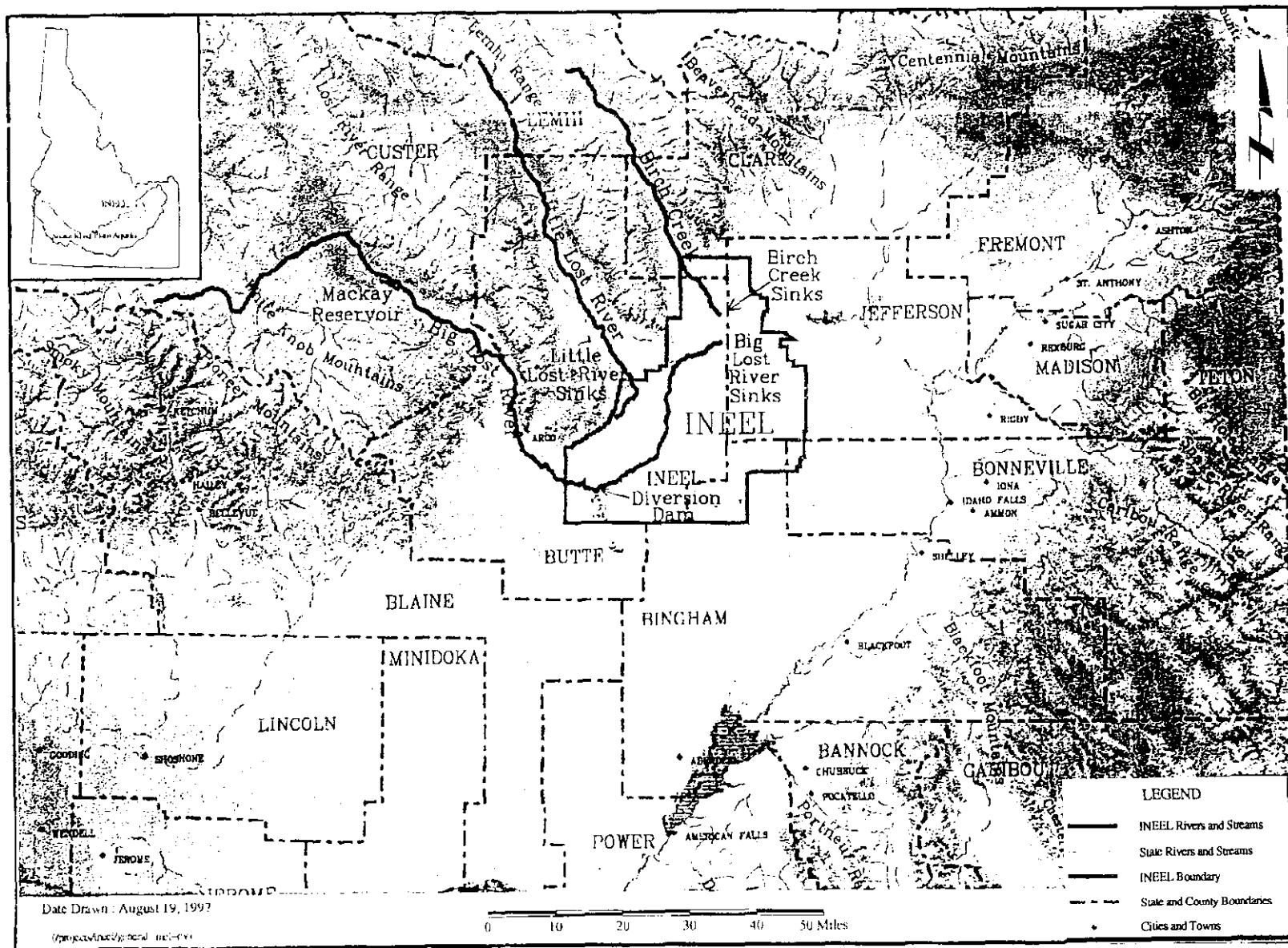
Various chemical and radioactive wastes were generated from these three reactors and the support facilities at ANL-W. The operation of these facilities and the corresponding waste streams have been evaluated and documented in the Facility Assessment and Screening document of 1973. This document, which is based on process knowledge, has been used as an initial starting point for ANL-W cleanup activities.

### **2.3 Identification of Release Sites**

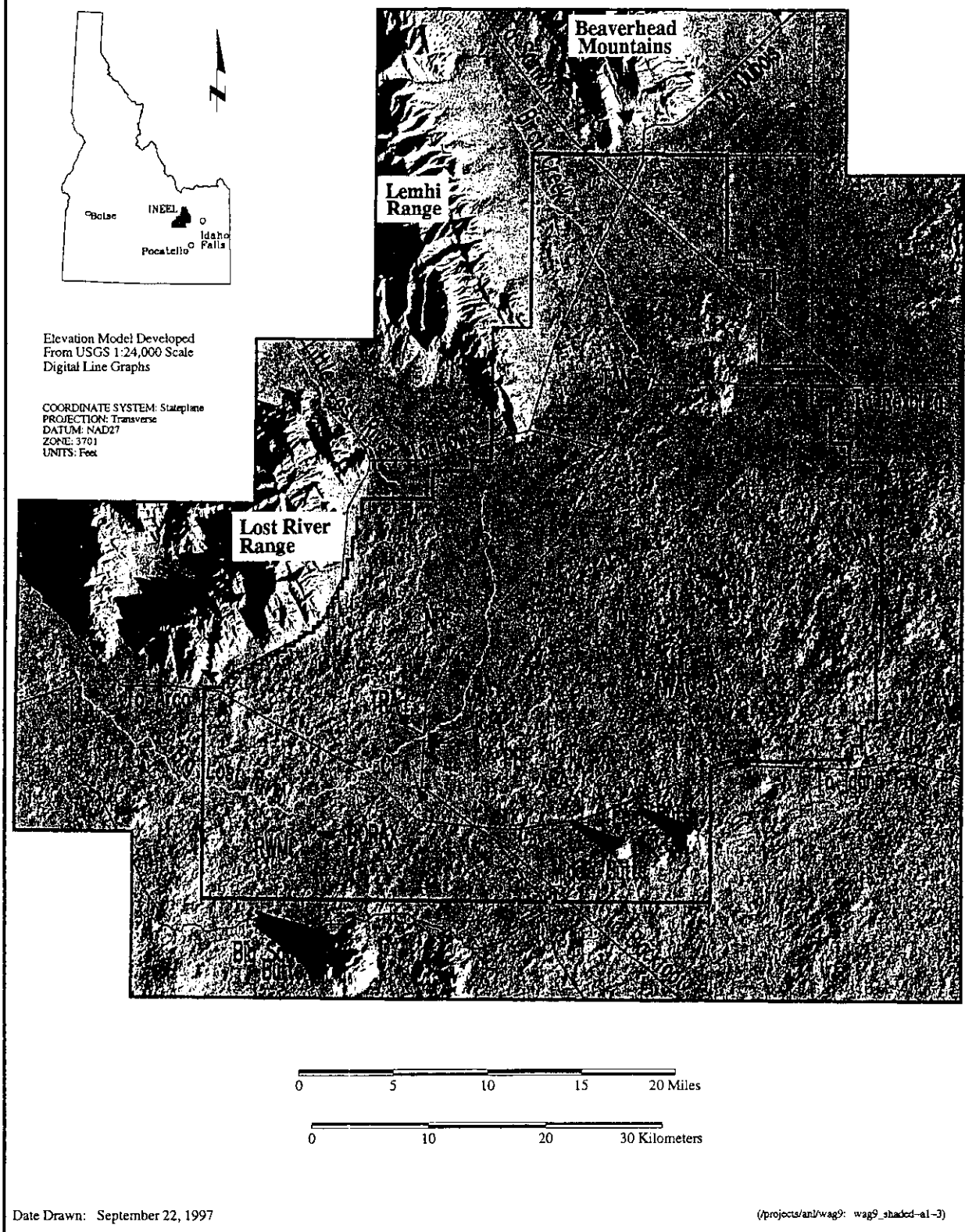
Potential release sites identified at ANL-W facilities in the Federal Facility Agreement and Consent Order (FFA/CO) include wastewater structures and leaching ponds, underground storage tanks, rubble piles, cooling towers, an injection well, french drains, and assorted spills. Possible COPCs at the various ANL-W sites include primarily petroleum products, acids, bases, PCBs, radionuclides, and heavy metals. These are the chemical and radioactive wastes generated from the scientific and engineering research at ANL-W.

### **2.4 Enforcement Activities**

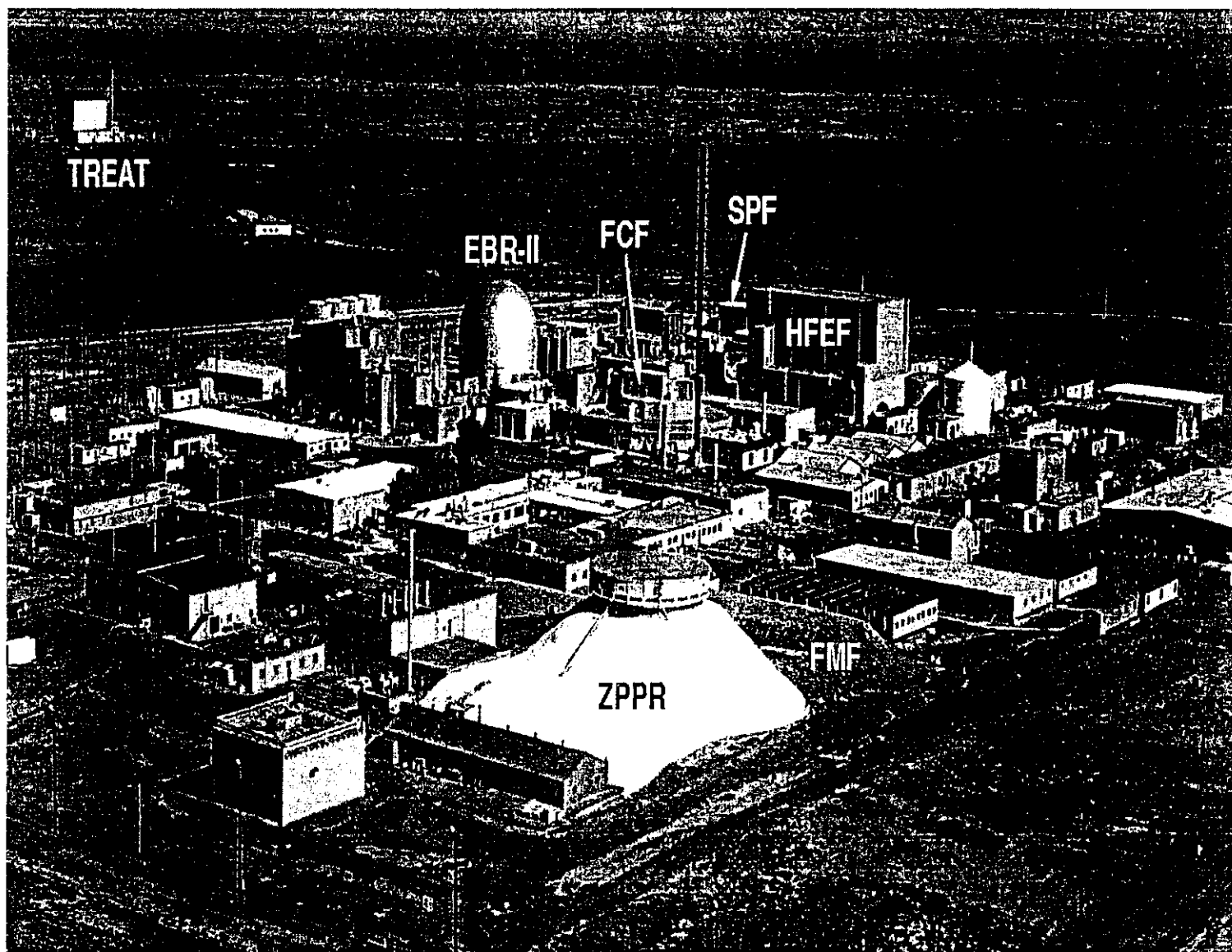
In July 1989, the Environmental Protection Agency proposed listing the INEEL on the National Priorities List (NPL) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).



# Idaho National Engineering and Environmental Laboratory



**Figure 2-2.** Shaded Relief Map of WAG 9 and INEEL.



**Figure 2-3.** Aerial View of the ANL-W Facility Showing the Main Facilities.

EBR-II -Experimental Breeder Reactor  
 FCF -Fuel Cycle Facility  
 FMF -Fuel Manufacturing Facility  
 HFEF -Hot Fuel Examination Facility  
 SPF -Sodium Processing Facility  
 ZPPR -Zero Power Physics Reactor  
 TREAT -Transient Reactor Test Facility

The EPA issued a final ruling that listed the INEEL as an NPL site in November 1989. The FFA/CO was developed to establish the procedural framework and schedule for developing, prioritizing, implementing, and monitoring response actions at the INEEL in accordance with CERCLA, the Resource Conservation and Recovery Act (RCRA), and the Idaho Hazardous Waste Management Act. The DOE, EPA and IDHW have determined that hazardous waste release sites at ANL-W would be remediated through the CERCLA process, as defined in the FFA/CO, which superseded the existing RCRA-driven Consent Order and Compliance Agreement requirements. The FFA/CO identified 4 OUs consisting of 19 sites within Waste Area Group 9 that required additional activities under the CERCLA process. An additional 18 sites were determined to need no further action at the time the FFA/CO was signed. Thus, a total of 37 WAG 9 sites were evaluated during the OU 9-04 Comprehensive RI/FS process and the results are summarized in this ROD.

One unit in OU 9-04 [Main Cooling Tower Blowdown Ditch (ANL-01A)] was originally included as a Land Disposal Unit under the RCRA Consent Order and Compliance Agreement (COCA) on the basis that corrosive liquid wastes were discharged after 1980. DOE, along with the EPA and IDHW WAG 9 managers, have determined that the Main Cooling Tower Blowdown Ditch is a RCRA Land Disposal Unit and will be remediated under the CERCLA process in accordance with the applicable substantive requirements of RCRA/Hazardous Waste Management Act (HWMA), if an unacceptable risk to human health or the environment. However, the FFA/CO has only adopted RCRA corrective action (3004 (u) & (v)), and not RCRA/HWMA closure. Therefore, upon completion of the remedial action, the DOE must receive approval from the IDHW Department of Environmental Quality director that the Main Cooling Tower Blowdown Ditch has been closed pursuant to RCRA/HWMA closure requirements.

The OU 9-04 comprehensive RI/FS conducted ANL-W resulted in the identification of eight areas with potential risk to human health and/or the environment that would require some type of remedial action (W7500-000-ES-02, October 1997). The Proposed Plan (January 1998) identified the agencies' preferred alternative for the eight areas of concern at ANL-W.



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### 3 HIGHLIGHTS OF COMMUNITY PARTICIPATION

In accordance with CERCLA §113(k)(2)(B)(I-v) and §117, a series of opportunities for public information and participation in the RI and decision process for the WAG 9, ANL-W, was provided to the public from March 1994 through March 1998. The opportunities to obtain information and provide input include "kickoff" fact sheets, which briefly discussed the status of the comprehensive investigation, articles in the *INEEL Reporter* (a publication of the INEEL's Environmental Restoration Program), three Citizens' Guide supplemental updates, presentations to members of the Citizens Advisory Board, a proposed plan January 1998, and public meetings. Specific details on how each of the opportunities for the citizens to obtain additional information on WAG 9 are presented below.

Articles in the March 1994 and November/December 1997 issues of the *INEEL Reporter* were distributed to approximately 6,700 members of the INEEL Community Relations Plan mailing list. The articles contained status reports on activities conducted at WAG 9 in addition to information on how to get additional information in the INEEL Information Repositories.

Three Citizens' Guide supplemental updates in March/April 1996, April/May 1996, and 1997 annual guide were also mailed to about 6,700 members of the public on the INEEL Community Relations Plan mailing list. These Citizen's Guide supplemental updates had specific sections on cleanup activities in WAG 9. Each of the Citizens' Guide supplemental updates also included information on how to get more information about WAG 9 via the internet, toll-free phone number, Administrative Record/Information Repositories, videos, and the INEEL Regional Office in Boise.

The kickoff fact sheet was mailed in September 1996 to members of the public on the INEEL Community Relations Plan mailing list to encourage participation prior to the initiation of work on the Comprehensive RI/FS. The information on how to request a briefing, or to get more information on OU 9-04 documents was printed on the back of the kickoff fact sheet.

On January 20, 1998, a brief presentation on the proposed plan was presented to the Citizens Advisory Board. The advisory board consists of a group of 15 individuals, representing the citizens of Idaho, who make recommendations to DOE, EPA, and the State of Idaho regarding environmental restoration activities at the INEEL. The Citizens Advisory Board meetings are open to the general public.

Copies of the proposed plan were mailed to approximately 6,700 members of the public on the INEEL Community Relations Plan mailing list on January 6, 1998, urging citizens to comment of the proposed plan and to attend public meetings. Display advertisements announcing the same information concerning the availability of the proposed plan and the locations of public meetings, and the comment period extension, appeared in six regional newspapers during the weeks of January 12 and 19, and February 9 in Idaho Falls, Boise, Moscow, Fort Hall, Pocatello, and Twin Falls. Large display advertisements appeared in the following newspapers: the Post Register (Idaho Falls); the Sho-Ban News (Fort Hall); the Idaho State Journal (Pocatello); the Times News (Twin Falls); the Idaho Statesman (Boise); and the Daily News (Moscow).

In January 1998, DOE issued a news release to more than 100 media contacts informing them of the beginning of a 30-day public comment period pertaining to the WAG 9 ANL-W proposed plan. This

comment period began January 12, and ended on March 12, 1998 in response to a request from the public, for a 30 day extension. Most of the news releases resulted in a short note in community calendar sections of the newspapers and in public service announcements on radio stations. The fact sheets, INEEL Reporter, and the proposed plan all identified that additional documentation on WAG 9 is available in the Administrative Record section of the INEEL Information Repositories located in the INEEL Technical Library in Idaho Falls, in the INEEL Boise Office, and in public libraries in Fort Hall, Pocatello, and Moscow.

For the general public, the activities associated with participating in the decision-making process included receiving the proposed plan, receiving telephone calls, attending the availability sessions one-half hour before the public meetings to informally discuss the issues, and submitting verbal and written comments to the agencies during the 60-day public comment period. At the request of the Shoshone-Bannock Tribes, a informal presentation of the proposed plan was given to Tribal members and their technical staff on January 7, 1998.

Postage-paid business-reply comment forms were available to those attending the public meetings. The forms were used to submit written comments either at the meeting or by mail. In addition, the reverse side of the meeting agenda contained a form for the public to use in evaluating the effectiveness of the meetings. A court reporter was present at each meeting to keep transcripts of discussions and public comments. The meeting transcripts were placed in the Administrative Record section for the WAG 9, OU 9-04 in the five INEEL Information Repositories. For those who could not attend the public meetings, but wanted to make formal written comments, a postage-paid written comment form was attached to the proposed plan.

A Responsiveness Summary has been prepared and is included as Appendix A to this ROD. All formal verbal comments presented at the public meetings and all written comments are included in Appendix A and in the Administrative Record for the ROD. Those comments are annotated to indicate who made the comment and the page number where the DOE response can be found in the Responsiveness Summary.

A total of about 75 people not associated with the project attended the public meetings. Overall, nine citizens or groups provided formal comments. All comments received on the proposed plan were considered during the development of this ROD. The decision document presents the selected remedial action for the WAG 9, OU 9-04, chosen in accordance with CERCLA, as amended by Superfund Amendments and Reauthorization Act and, to the extent practicable, the National Contingency Plan. The decision for this site is based on the information in the Administrative Record for OU 9-04.

## **4 SCOPE OF OPERABLE UNITS AND RESPONSE ACTIONS**

Under the FFA/CO, the INEEL is divided into 10 WAGs, of which ANL-W is included as WAG 9. WAG 9 is further subdivided into four OUs that included a total of 37 release sites. The four OUs are classified as: Remedial Investigation Sites, Track 2 Sites, Track 1 Sites, "No Action" Sites. In addition to the WAG 9 sites, two sites from WAG 10 are included in the evaluation of WAG 9. The inclusion of these two WAG 10 sites into the WAG 9 ROD was based on the close physical location of these sites to other WAG 9 facilities. These WAG 10 sites did not have individual risks but may add to the cumulative risks of WAG 9. Table 4-1 shows the 39 sites that were evaluated as part of the OU 9-04 Comprehensive RI/FS, 37 sites from WAG 9, and two sites from WAG 10.

The task of the "comprehensive" RI/FS is to evaluate contamination of environmental media (soil, air, and groundwater) and the potential risks to human health and the environment from exposure via those pathways. Each of the retained sites has undergone a "comprehensive" evaluation because risks from all known and potential release sites within WAG 9 and the two sites from WAG 10 have been evaluated. In addition, it is also "cumulative" because the receptor may be exposed to contamination from multiple release pathways (e.g., air and groundwater exposure pathways), from multiple release sites. Analyzing the air and groundwater pathways in a cumulative manner is necessary because contamination from all release sites within a WAG are typically isolated from one another with respect to the soil pathway exposure routes. Therefore, the soil pathway exposure route is analyzed on a release site specific or "noncumulative" basis in the INEEL comprehensive risk assessments.

From the evaluation of the 39 sites that were evaluated as part of this ROD, eight areas at ANL-W have actual or threatened releases of hazardous substances, which, if not addressed by implementing the response actions selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment. These eight areas are subunits of five CERCLA sites (ANL-01, ANL-01A, ANL-04, ANL-09, and ANL-35) identified in the FFA/CO. This includes one area with only unacceptable risks to human health, five areas with only unacceptable risks to the ecological receptors, and two sites with unacceptable risks to both human health and the ecological receptors. The screening, development, and detailed analysis of the remedial alternatives resulted in the selected alternative for each of the retained sites. These alternatives met the goals established for reducing or eliminating risks to human health and the environment and for complying with applicable or relevant and appropriate requirements (ARARs).

In addition to the eight areas that require some type of remedial action, this comprehensive ROD also addresses 33 WAG 9 areas that do not pose an unacceptable risk to human health or the environment, based on the evidence compiled during the OU 9-04 Comprehensive RI/FS. These 33 areas are being recommended for No Action and, with approval of this ROD, the No Action decision is formalized.

**Table 4-1.** Summary of data available for WAG 9 and WAG 10 release sites evaluated in the OU 9-04 comprehensive RI/FS.

OU	Site	Site description	COCs	Data available	Source of information
None	ANL-10	Dry Well between T-1 and ZPPR Mound	None	Interviews with facility personnel indicate that the dry well was hooked up to a septic tank which was removed in 1966. Therefore, no source exists.	Initial Assessment Report for ANL-W (1986).
None	ANL-11	Waste Retention Tank 783	None	Interviews of former facility operators indicate that no hazardous constituents were ever disposed at the tank; Therefore, no source exists.	Initial Assessment Report for ANL-W (1986), Summary Assessment Report (1990a).
None	ANL-12	Suspect Waste Retention Tank by 793	None	Interviews of former facility operators indicate that the tank was removed in 1979 and that no source exists.	Initial Assessment Report for ANL-W (1986), Summary Assessment Report (1990a).
None	ANL-14	Septic Tank and Drain Fields (2) by 753	None	Process knowledge and interviews with plant services personnel indicate that the only materials disposed were trace quantities of cleaning supplies. The tank was removed in 1979 and no source exists.	Initial Assessment Report for ANL-W (1986), Summary Assessment Report (1990a).
None	ANL-15	Dry Well by 768	None	Process knowledge and interviews with facility personnel indicate that the only hazardous constituent disposed was hydrazine.	Initial Assessment Report for ANL-W (1986), Summary Assessment Report (1990a).
None	ANL-16	Dry Well by 759 (2)	None	Process knowledge and interviews with facility personnel indicate that the only hazardous constituent disposed was hydrazine.	Initial Assessment Report for ANL-W (1986), Summary Assessment Report (1990a).
None	ANL-17	Dry Well by 720	None	Process knowledge and interviews with facility personnel, no hazardous constituents were ever disposed and therefore no source exists.	Initial Assessment Report for ANL-W (1986), Summary Assessment Report (1990a).
None	ANL-18	Septic Tank and Drain Field by 789	None	The septic tank and drain field were removed in 1979. Process knowledge and interviews with facility personnel indicate that no hazardous constituents were disposed at the site.	Initial Assessment Report for ANL-W (1986).
None	ANL-20	Septic Tank and Drain Field by 793	None	Engineering drawings, and interviews with employees indicate no hazardous constituents were disposed and therefore no source exists.	Initial Assessment Report for ANL-W (1986), Summary Assessment Report (1990a).

**Table 4-1. (continued).**

OU	Site	Site description	COCs	Data available	Source of information
None	ANL-21	TREAT Suspect Waste Tank and Leaching Field (Non-radioactive)	None	Process knowledge and interviews with plant services personnel indicate that the only materials disposed were trace quantities of cleaning supplies, therefore, no source exists.	Initial Assessment Report for ANL-W (1986), Summary Assessment Report (1990a).
None	ANL-22	TREAT Septic Tank and the current Leaching Field	None	Process knowledge and interviews with facility personnel indicate that no hazardous constituents were disposed at the site; therefore, no source exists.	Initial Assessment Report for ANL-W (1986).
None	ANL-23	TREAT Seepage Pit and Septic Tank West of 720	None	Process knowledge and interviews with facility personnel indicate that no hazardous constituents were disposed at the site. The tank was filled with sand in 1980; therefore, no source exists.	Initial Assessment Report for ANL-W (1986).
None	ANL-24	Lab and Office Acid Neutralization Tank	None	Process knowledge and interviews with facility personnel indicate that no hazardous constituents were disposed at the site. Therefore, no source exists.	Initial Assessment Report for ANL-W (1986).
None	ANL-25	Interior Building Coffin Neutralization Tank	None	After neutralization with sodium hydroxide, the liquid was transferred to the retention tank. Thus, no source exists.	Initial Assessment Report for ANL-W (1986), Summary Assessment Report (1990a).
None	ANL-26	Critical Systems Maintenance Degreasing Unit	None	The degreasing unit is self-contained and is inside another building. No evidence exists (from spill records and interviews) of any hazardous constituents being spilled. All wastes are collected by a commercial vendor, therefore no source exists.	Initial Assessment Report for ANL-W (1986), Summary Assessment Report (1990a).
None	ANL-27	Plant Services Degreasing Unit	None	The degreasing unit is self-contained and is inside another building. No evidence exists (from spill records and interviews) of any hazardous constituents being spilled. All wastes are collected by a commercial vendor; therefore no source exists.	Initial Assessment Report for ANL-W (1986), Summary Assessment Report (1990a).
None	ANL-32	TREAT Control Building 721 Septic Tank and Leach Field (Present)	None	Process knowledge and interviews with facility personnel indicate that no hazardous constituents were disposed at the site; therefore, no source exists.	Initial Assessment Report for ANL-W (1986), Summary Assessment Report (1990a).
None	ANL-33	TREAT Control Building 721 Septic Tank and Seepage Pit	None	Process knowledge and interviews with facility personnel indicate that no hazardous constituents were disposed at the site. The tank was removed in 1978 and no source exists.	Initial Assessment Report for ANL-W (1986), Summary Assessment Report (1990a).

**Table 4-1. (continued).**

OU	Site	Site description	COCs	Data available	Source of information
9-01	ANL-04	ANL Sewage Lagoons	Metals and radionuclides	Sludge samples were collected in 1994 and analyzed for metals and radionuclides.	Track 1 Decision Documentation Package (ANL-W 1995a) identified further evaluation of 1 million gallon water loss. This was evaluated in the OU 9-04 RI/FS Work Plan. The data is also summarized in Section 3.1.1.1 of this OU 9-04 RI/FS report.
9-01	ANL-19	Sludge Pit West of T-7 (Imhoff Tank)	None	Engineering drawings indicate that industrial wastes and laboratory process wastes were discharged to a separate waste piping system. The tank was filled with dirt in 1978. Therefore no source exists.	Track 1 Decision Documentation Package (RUST Geotech 1994a).
9-01	ANL-28	EBR-II Sump	Sulfuric acid and hexavalent chromium	Based on water chemistry results, the hexavalent chromium was reduced to trivalent chromium and the pH of the liquid discharged typically ranged between 4-11.	Track 1 Decision Documentation Package (RUST Geotech 1994b).
9-01	ANL-29	Industrial Waste Lift Station	Silver	Sludge samples were collected in 1986, 1990, and 1995 and analyzed for silver.	Track 1 Decision Documentation Package (ANL-W 1995b).
9-01	ANL-30	Sanitary Waste Lift Station	Silver	Process knowledge, review of historical records, and drawings indicate there was a release of silver to the site.	Track 1 Decision Documentation Package (ANL-W 1994a).
9-01	ANL-36	TREAT Photo Processing Discharge Ditch	Silver	Soil samples were collected in 1987 and analyzed for silver.	Track 1 Decision Documentation Package (RUST Geotech 1994c).
9-01	ANL-60	Knawa Butte Debris Pile	None	Process knowledge of where the soil and debris was moved from indicate there is no source at the site.	Track 1 Decision Documentation Package (ANL-W 1994b).
9-01	ANL-61+	EBR-II Transformer Yard	PCBs	Analytical results from the soil at this site during removal of the transformers.	Track 1 Decision Documentation Package (RUST Geotech 1994d).
9-01	ANL-61A+	PCB-contaminated soil adjacent to ANL-61	PCBs	Analytical results from the soil at this site during removal of the transformers.	Track 1 Decision Documentation Package for ANL-61 (RUST Geotech 1994d).
9-01	ANL-62	Sodium Boiler Building (766) Hotwell	None	Process knowledge and interviews with facility personnel indicate that the only hazardous constituents disposed were hydrazine and tritium.	Track 1 Decision Documentation Package (ANL-W 1994c).
9-01	ANL-63	Septic Tank 789-A	None	Process knowledge and interviews with facility personnel indicate that no hazardous constituents were disposed at the site. Therefore no source exists.	Track 1 Decision Documentation Package (RUST Geotech 1994e).

**Table 4-1. (continued).**

OU	Site	Site description	COCs	Data available	Source of information
9-02	ANL-08	EBR-II Leach Pit (Radioactive)	Radionuclides, metals, dioxins, and semivolatile organic compounds	Analytical results from sludge soil and basalt and groundwater samples collected in 1991 and 1993.	9-02 Track 2 Summary Report (RUST Geotech 1994b).
9-03	ANL-05	ANL Open Burn Pits #1, #2, and #3	Metals, radionuclides, VOCs, PAHs, and dioxins/furans	Site inspections, historical records, and analytical results from soil samples collected in 1988 and 1994.	Revised 9-03 Track 2 Summary Report (ANL-W 1995c).
9-03	ANL-31	Industrial/Sanitary Waste Lift Station (Industrial Side Not Used)	Metals and radionuclides	Historical operational knowledge and analytical results of the sampling conducted in 1995.	Revised 9-03 Track 2 Summary Report (ANL-W 1995c).
9-03	ANL-34	Fuel Oil Spill by Building 755	Fuel Oil (benzene/naphthalene)	Modeling results based on the estimated volume of the fuel oil spill.	Revised 9-03 Track 2 Summary Report (ANL-W 1995c).
9-04	ANL-01	Industrial Waste Pond and Cooling Tower Blowdown Ditches A, B, and C)	Metals, radionuclides, VOCs, and herbicides	Analytical results from soil, sludge, and water samples at the IWP collected in 1986, 1987, 1988 and 1994 and analytical results from soil samples collected at the ditches in 1988 and 1994.	Revised Preliminary Scoping Package (ANL-W 1995d).
9-04	ANL-01A	Main Cooling Tower Blowdown Ditch	Metals, radionuclides, and semivolatile organic compounds	Analytical results from soil samples collected in 1987, 1988 and 1994.	Revised Preliminary Scoping Package (ANL-W 1995e).
9-04	ANL-09	ANL Interceptor Canal -Canal, and -Mound portions	Metals and radionuclides	Analytical results from soil samples collected in 1994.	Revised Preliminary Scoping Package (ANL-W 1995f).
9-04	ANL-35	Industrial Waste Lift Station Discharge Ditch	Metals, radionuclides, VOCs, and dioxin/furans	Analytical results from soil samples were collected in 1988 and 1994 and analytical results from water samples collected in 1988.	Revised Preliminary Scoping Package (ANL-W 1995g).
9-04	ANL-53	Cooling Tower Riser Pits	Metals	Analytical results from soil samples collected in 1989.	Preliminary Scoping Package (ANL-W 1993).
10-06*	-	ANL-W Windblown Soil	Radionuclides	Analytical results from RESL 1993	RI/FS for 10-06 (LMIT 1995)
10-06*	-	ANL-W Stockpile	Radionuclides	48 Soil Samples in 1994	RI/FS for 10-06 (LMIT 1995)

+ ANL-61 and ANL-61A is counted as one site that has undergone two phases of cleanup.

\* These OU 10-06 sites have been added for inclusion in the 9-04 RI/FS.



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